



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,507	04/06/2005	Pasi Tikka	14219-080US1 P2002,0843 U	5763
26161 7590 03/05/2007 FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			EXAMINER SUMMONS, BARBARA	
			ART UNIT	PAPER NUMBER
			2817	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/05/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/530,507

Applicant(s)

TIKKA ET AL.

Examiner

Barbara Summons

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-12 and 14-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-12, 14 and 16-23 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date 12/8/06.

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Withdrawn Allowable Subject Matter***

1. The indicated allowability of the subject matter of prior claim 13 is withdrawn because the Examiner erred in that claim 13 should have been included in the rejection in the prior Office action in view of Shibata et al. (of record). Therefore, this Office action will not be made Final.

### ***Withdrawn Claim Rejections - 35 USC §§ 102 and 103***

2. Applicants' amendment and arguments received 12/8/06 have overcome all of the prior rejections, and they are withdrawn. Note that the Aigner et al. reference is overcome by the added feature to claim 11 of "a coupling layer..." between the upper and lower resonators, and not by virtue of its filing date of April 17, 2003 being later than October 8, 2002 (see page 7, lines 10-13 of the amendment) since Applicants are not entitled to the October 2002 date unless and until a certified translation of the foreign priority document is provided to perfect the foreign priority claim.

### ***New Grounds of Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

Art Unit: 2817

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 2-10, 16-18, 21 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Klee et al. U.S. 2001/0048352 (of record) in view of Ohara et al. U.S. 2003/0067368.

Klee et al. discloses the features of the invention including at least bulk acoustic wave (BAW) resonators and a capacitor in parallel with a BAW resonator formed on the same carrier substrate, as discussed in detail in paragraph 4 of the prior Office action.

However, as correctly argued by Applicants (see the second full paragraph on page 8 of the amendment), the Klee et al. reference only explicitly shows a ladder filter arrangement and not a lattice filter arrangement or a stacked crystal filter arrangement.

Klee et al. does explicitly disclose that the filter arrangement shown in the figures is only one of numerous possible filter arrangements known to those of ordinary skill in the art of BAW filters (see section [0071] and section [0072], lines 1-5).

Ohara et al. is analogous art also concerned with tunable BAW filters, and provides evidence that means for providing tunable ladder filters are equally applicable to tunable lattice filters [see Fig. 6(a) vs. Fig. 10 and Figs. 11 & 12 vs. Figs. 13 & 14].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the tunable ladder filter arrangement with

Art Unit: 2817

capacitors in series and in parallel with the BAW resonators of Klee et al. (Figs. 1-3) by having provided a tunable lattice filter arrangement with the same capacitors in series and parallel with the BAW resonators, because Klee et al. explicitly suggests that its tuning be used with other filter arrangements (see sections [0071] and [0072], lines 1-5), which one of ordinary skill in the art would have known included lattice filters as well as ladder filters as suggested by the exemplary teaching of Ohara et al. [Figs. 6(a), 11 and 12, vs. Figs. 10, 13 and 14], and such a choice of filter arrangements would have been routine in the art based on intended use, such as for connection to balanced (lattice) or unbalanced (ladder) peripheral circuits.

5. Claims 11, 12, 14 and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shibata et al. JP 2002-217676 (of record) in view of Ohara et al. U.S. 2003/0067368.

Shibata et al. discloses features of the invention as discussed in paragraph 5 of the prior Office action and repeated here with additions to address claim 11 as amended. Figs. 1 and 2 of Shibata et al. disclose an electrical circuit comprising: a substrate 30; a stack of resonators, the stack comprising: two first BAW resonators 12 and 14 being a lower resonator 12 that is formed by a lower electrode 40, an upper electrode 46 and an intervening piezoelectric layer 44, and an upper resonator 14 that is formed by a lower electrode 52, an upper electrode 56 and an intervening piezoelectric layer 54; a second BAW resonator that is a single resonator 16, which inherently has an equivalent circuit that is an LC resonator, is formed by a lower electrode 42 that is

Art Unit: 2817

connected to ground, an upper electrode 46 and an intervening piezoelectric layer 44; wherein the upper electrode 46 of the lower resonator 12, and the lower electrode 52 of the upper resonator 14 are electrically connected to the upper electrode 46 of the second resonator 16; and a coupling layer 48 is between the upper electrode 46 of the lower resonator 12 and the lower electrode 52 of the upper resonator 14. Note that layer 48, which is a dielectric (see the abstract), is considered a "coupling" layer because its mere presence affects the coupling between the lower and upper stacked resonators 12 and 14, the presence of the coupling layer 48 necessarily rendering the coupling between the resonators different than the coupling would be if the resonators were in direct physical contact, that is in the absence of a coupling layer 48. In other words Figs. 1 and 2 of Shibata et al. have the same structure as Applicants' Figs. 10a and 11, with the "coupling" layer 48 in Fig. 2 of Shibata et al. being analogous to Applicants' coupling layer KS1 in their Fig. 11.

However, as correctly argued by Applicants (see the amend. at page 7, the last three lines thereof), Shibata et al. shows cavities 34 and 36 under the resonators and does not show an acoustic mirror between the substrate 30 and the stack of resonators.

Ohara et al. provides evidence that there are several art recognized alternative ways in the BAW resonator art to isolate such resonators from the underlying substrate so that the energy from the resonator is not lost into the substrate. These ways are a cavity shown in Fig. 1, a bridge and air-gap over the substrate as shown in Fig. 2, and an acoustic mirror between the substrate and the resonator as shown in Fig. 3 (see also sections [0099], [0101] and [0103]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the electrical circuit of Shibata et al. (Figs. 1 and 2) by having replaced the cavity 34 (Fig. 2) with an acoustic mirror, because such an obvious modification would have been the mere substitution of an art recognized alternative structure for isolating the acoustic resonators from the underlying structure as would have been known by one of ordinary skill and as evidenced and thereby suggested by the exemplary teaching thereof by Ohara et al. (Figs. 1-3 and sections [0099], [0101] and [0103]).

6. Claims 19 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Klee et al. U.S. 2001/0048352 (of record) in view of Ohara et al. 2003/0067368 as applied to claim 8 above, and further in view of Panasik U.S. 6,548,942 (of record) for reasons of record.

The Klee et al./Ohara et al. combination discloses the invention as discussed above and in paragraph 4 of the prior Office action.

However, while Klee et al. discloses an acoustic mirror between the resonators and the substrate and discloses using an electrode layer as an acoustic mirror layer, Klee, and therefore the Klee/Ohara combination, only shows a protective layer 10 at the upper layer region and does not disclose an acoustic mirror at the upper layer region of the resonators.

Panasik discloses such an overlying acoustic mirror to provide the benefit of preventing the protective layer/encapsulant from damping the resonator vibrations (see e.g. the abstract, lines 1-6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the BAW filter of the Klee/Ohara combination by having provided an acoustic mirror at the upper layer region of the resonators (i.e. between the resonators and the protective layer 10 of Klee) as suggested by the exemplary teaching thereof by Panasik (Fig. 4), because such an obvious modification would have provided the benefit of not allowing the protective layer/encapsulant to damp the resonator vibrations as explicitly suggested by Panasik (see e.g. the abstract, lines 1-6).

#### ***Allowable Subject Matter***

7. Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

8. Applicant's arguments with respect to claims 8 and 11 have been considered but are moot in view of the new ground(s) of rejection.



Art Unit: 2817

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs  
February 28, 2007

  
**BARBARA SUMMONS**  
**PRIMARY EXAMINER**